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## Studies on *Camponotus* (*Myrmaphaenus*) *andrei* Forel (Hymenoptera, Formicidae)

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In the spring of 1953, while collecting on the Mexican Plateau, I had the good fortune to find 11 colonies of *Camponotus* (*Myrmaphaenus*) *andrei*, in nine of which majors were present. A female was taken in three of the colonies. The features of both of these previously unknown castes had been briefly noted in a paper on *C. (M.) yogi*, which Snelling and I published in 1966. The present paper attempts to show the effect of these features on the previous taxonomy of *andrei*, for it is now clear that several earlier ideas about *andrei* were incorrect.

When Forel described *andrei* in 1884 the type material left much to be desired. It consisted of a small series of workers in the collection of the Museum of Lyons, and a single worker which André had given to Forel. Except for the fact that all the specimens had come from Mexico, Forel knew nothing of their source, nor was there any indication as to who had collected them. Moreover, the type series of *andrei* was so fragmentary that Forel was unable to decide whether the worker caste was dimorphic or polymorphic. He noted that, whereas there were slight size variations in the smaller members of the type series, there were no intermediates to connect these with the larger members of the series. There were, therefore, two possibilities: either the medias did not exist, in which case Forel would have placed *andrei* in *Colobopsis* (at that time a separate genus); or

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medias did exist, in which case *andrei* would have to be assigned to *Camponotus*. As the latter is what Forel did, he must have surmised that medias of *andrei* would subsequently be found. In point of fact they had already been found, for what Forel regarded as the major or *andrei* is actually a media.

Dalla Torre (1893) cited Colombia as a locality for *andrei*, and Forel (1899), who was in no position to question this record, cited Dalla Torre's locality. This was unfortunate, for it saddled a species not yet taxonomically sound with what has proved to be a largely erroneous geographical range.

No definitive distributional data for *andrei* were forthcoming until 1914. In that year W. M. Wheeler published a paper on specimens that W. M. Mann had taken at Pachuca in the state of Hidalgo, Mexico. Except for the fact that Mann's series contained the hitherto unknown male of *andrei*, it was little better than Forel's type series. To judge from specimens at present in the collection of the American Museum of Natural History, Mann's series also lacked the majors and smaller medias. Although Mann's material appeared to have shown slightly more size variation, it is understandable that Wheeler avoided the issue of polymorphism. It could be wished that Wheeler had been equally reluctant to give Mann's specimens a varietal name. The variation in the nest series taken in 1953 makes it impossible to defend the validity of Wheeler's variety *cholericus*. One of Wheeler's main criteria for the recognition of *cholericus* was the more deeply impressed anterior margin of the clypeus. In *andrei* the extent of the clypeal impression is an allometric feature that increases as the size of the worker increases. Wheeler's recognition of *cholericus*, therefore, results from the fact that some of his medias were a little larger than the cotype media given him by Forel.

Once it is appreciated that Forel's "major" of *andrei* is actually a media, it may be seen that he presented an accurate description of that caste. Indeed, his description is good enough to indicate that what Forel described was a media with a head length of about 2.0 mm., mandibles excluded. In a nest series in which the full size range is represented, the head length of the worker (mandibles excluded) varies from 2.4 mm. to 1.5 mm. In most majors the sides of the head are parallel over most of their length, but in some majors the anterior half of the head is slightly wider than the posterior half. In either case a strongly quadrate head in which the clypeus is flanked by wide cheeks results. The front of the clypeus bears a deep, triangular depression the base of which extends entirely across the anterior edge of the clypeus. The center of this depression is deeper than its sides, making the depressed part of the

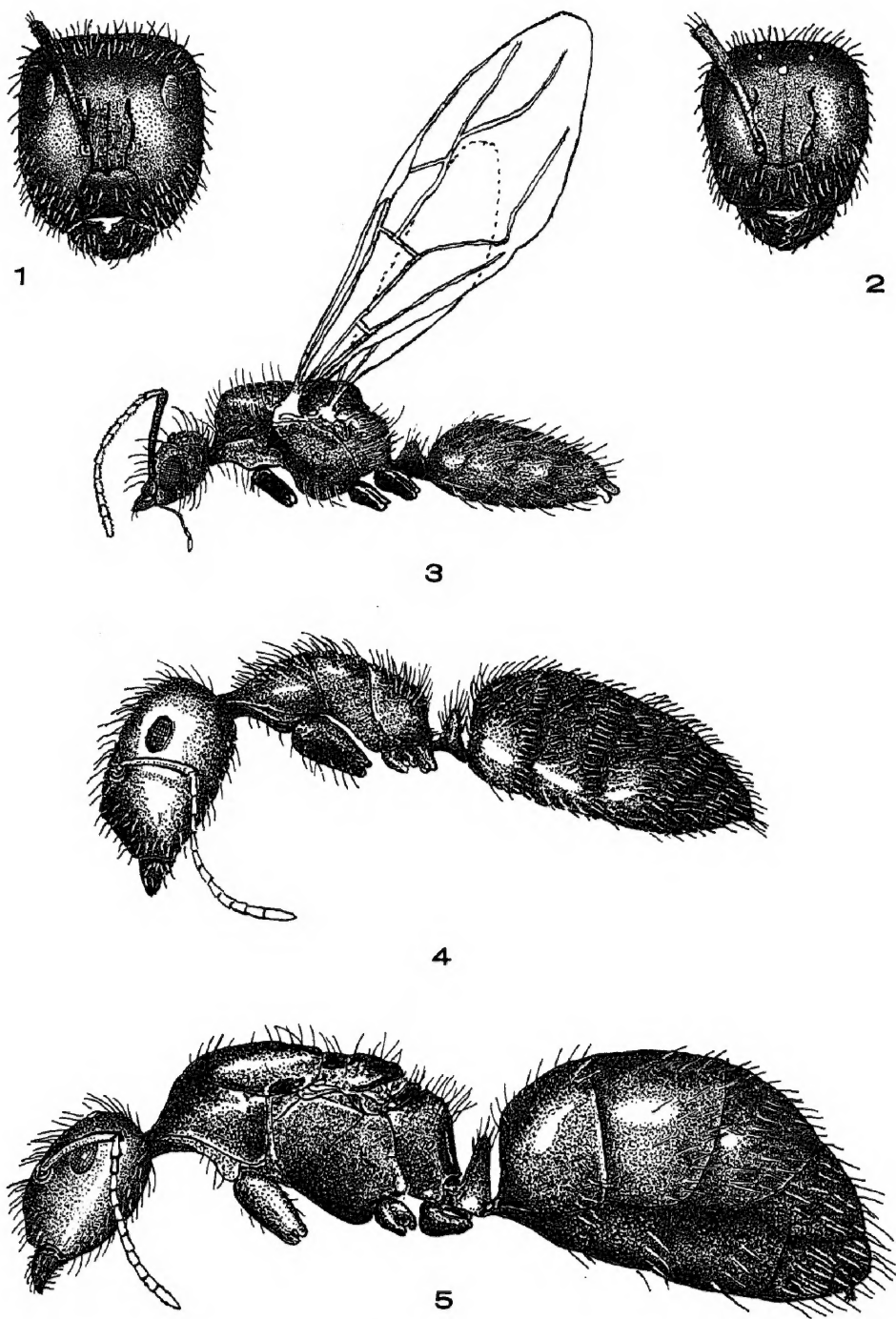


FIG. 1-5. *Camponotus (Myrmaphaenus) andrei*. 1. Head of major worker. 2. Head of female. 3. Male. 4. Major worker. 5. Female. All figures drawn to the same scale, by the author.

clypeus broadly concave. The remainder of the clypeus is flattened, feebly convex from front to back, and even less so from side to side. It descends to the cheeks through short, almost vertical, lateral faces. Instead of the customary carina, most majors have a shallow groove running down the middle of the clypeus. The flanking cheeks project well beyond the clypeus and thus the clypeus appears to be sunken between two rounded, flanking lobes (see fig. 1).

None of these features appears in the minor. In that caste the head narrows gradually from the level of the eyes to that of the mandibular insertions. The cheeks that flank the clypeus are thin. They do not form rounded lobes nor do they project beyond the clypeus. On the contrary, most of the anterior margin of the clypeus lies in front of the level at which the cheeks meet the mandibular insertions. The clypeus shows no anterior triangular depression and it is carinate over most of its length. In the mid-series media, in which the head length is about 2.0 mm., the head narrows anteriorly but not enough to prevent the formation of rounded lobes at either side of the clypeus. But the triangular depression on the clypeus is shallow and confined to the middle third of its anterior edge. The anterior edge of the clypeus is, therefore, at about the same level as the flanking lobes, although, as Forel noted, it is separated from them by a depression at either side. The media lacks a clypeal carina but it does not have the groove which replaces it in the major. Except for the fact that it has ocelli and somewhat larger eyes, the head of the female of *andrei* is strikingly like that of the mid-series media. The sides converge from the eyes to the mandibular insertions. The clypeus is ecarinate and bears a narrow and shallow median depression on its anterior edge, hence the clypeus is not sunken below the flanking lobes (see fig. 2). Perhaps the most remarkable similarity is that the head of the female measures only 2.0 mm. in length. In most species of *Camponotus* the head of the female is at least as large as, or larger than, that of the major. The small head of the female of *andrei* has nothing to do with the overall size of that caste, for the female is a notably larger insect than the major (see figs. 4, 5).

As has been pointed out in Creighton and Snelling (1966), essentially the same situation exists in the case of *yogi* and *ulcerosus*. In both these species the cephalic structure of the female is more like that of the media than the major. Although only three species are involved it appears that this fact has a special significance for *Myrmaphaenus*. To a very large extent, subgeneric criteria in *Camponotus* have been based on features shown by the worker caste. If this caste is only partially known, incorrect conclusions can scarcely be avoided. Emery (1925) knew nothing of the

major of *andrei*, the media of *yogi*, or the identity of *ulcerosus* and *bruesi*. Moreover, the female of each of these species had not yet been discovered. It is unlikely that Emery could have handled this situation correctly, and his misassignment of *ulcerosus* to the subgenus *Manniella* is readily understandable. But this error illustrates one of the main difficulties in Emery's (1925) version of *Myrmaphaenus*. The majors of some of the species show unique features which are so striking that they obscure the less spectacular subgeneric characters. Because the striking specific features of the major may be poorly developed or absent from the female, it follows that such females furnish much more reliable subgeneric features than do their majors. Had Emery been aware of this, it is probable he would not have expanded *Myrmaphaenus* to include the species formerly placed in *Paracolobopsis* and *Neomyrmamblys*. It is equally probable that if we concentrate on the female as well as on the major we may be able to resuscitate *Paracolobopsis* and *Neomyrmamblys*, and thereby reduce the heterogeneity of *Myrmaphaenus*.

As already noted, Mann's specimens of *andrei* were taken in Hidalgo near Pachuca at 8000 feet. The writer's records follow:

San Luis Potosi: Ventura at 5900 ft.; Queretaro: Palmillas at 7000 ft.; Zacatecas: 4 miles west of Sombrerete at 7900 ft., Ojocaliente at 6800 ft.; Durango: 10 miles west of Durango at 7200 ft. (six colonies), El Salto highway 7 miles west of Rio Chico at 7700 ft.

Most of the stations listed above lie in the tropics and the remainder are not very far north of the tropics, but this does not mean that *andrei* should be considered a Neotropical species. At the southern end of the Mexican Plateau the elevation bars many tropical species. The rule works both ways, for most of the species that live in the tropical parts of the plateau do not descend to low levels. Certainly *andrei* does not, as the elevational records clearly show. But, in addition to elevation, there are other factors that influence the distribution of *andrei*. This species shows a strong preference for dry, open, well-drained, hillside nest sites. Thus, although it may occur farther south in Mexico than the above records indicate, it is virtually certain that its range does not extend into Central America. This fact makes Dalla Torre's Colombia record unacceptable. In Durango the vertical range of *andrei* extends from the manzanita-scrub oak association to the lower edge of the live oak-pine zone. In either association the nests are so placed that there is no cover from the vegetation. The nests are usually built under stones and their complement of workers is small. The largest colony secured consisted of 110 individuals. Larvae were present in nests taken the last week in March, but no pupae were found. This suggests that *andrei* does not

produce brood throughout the year, for if it did, pupae would have been present. Brood production, however, must begin early in the year, for some of the larvae were large. These ants show surprising docility when their nests are disturbed and make little effort to remove the brood from the exposed galleries. The worker has a habit of standing beside a larva with its jaws touching it. When in this position the gaster of the worker is turned under until its tip is close to the larva. Although this response was observed many times, there was no indication that the worker was licking the larva or spraying anything on it from the gaster, although the posture of the worker strongly suggested the latter. I have never seen any other ant act in this way and can offer no explanation for this behavior. *Camponotus andrei* is easily identified in the field. The abundant, whitish body hairs show up clearly against the dark, black background. Moreover, the metallic blue reflections on the gaster and thorax are unusually strong in living specimens.

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